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ABSTRACT

The research findings of Siegel, Wohlwill, Goodman, and others suggest that reading is a thinking skill which may be facilitated by the instruction of transferable problem-solving skills. In order to maximize learning in young children, it is important to provide opportunities which allow the exchange of information and concepts from one activity to another. Classroom exercises are outlined which illustrate the basic concepts perceived as essential to the development of reading skills (patterning, comparison, classification, prediction, and hypothesis). Suggestions are included for manipulation of the classroom environment to provide centers for the instruction of these basic concepts. (KS)

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TEACHING FOR LOGICAL THINKING IS A PREREADING ACTIVITY

Reading is an active process of constructing meaning from language represented by graphic symbols that are systematically arranged, just as listening is the active process of constructing meaning from sound symbols. If language is viewed as a code, a system for communicating meaning, then reading may be seen as a process of decoding. Two significant factors instrumental in the decoding process are: (1) the experiential background of the learner, and (2) the conceptual background. The major aspect of transforming experience into symbols is most aptly described as conceptualizing for concepts must be realized before generalizations can be created. Reading is limited by experience, and experience is limited by conceptual development, but concepts are dependent upon strategies involving thinking skills (Hunt, 1961).

Conforming to the above considerations the intent of this article is three fold. First we will examine the relationship between thinking skills. Second we will review some research on the teaching of thinking skills that indicates how young children acquire an understanding of

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complex concepts. Third we will present an example that implements theory into practice.

Thinking and Reading

Starting from the position of adult knowledge, Piaget (1954) points out the profoundly different way that young children think from older persons. It is apparent for the young child that reasoning does not reach a stage of logical abilities until about age seven or eight. Supportive evidence is available from Rowher (1970), Almy (1966), and Furth (1970), which indicates that the general age span seven to eleven is the time when a child becomes able to reason abstractly, as required in reading. Prior to this time, behavior is the product of an outlook that is distorting, because thinking itself is based upon mental images that are closest to perception. Events, therefore, are reasoned by their outward appearance, and the environment is viewed with a non logical (from the adult view point) perspective. As an example: recall the number of times a child has asked a question whose answer he or she fully realizes, yet the information sought for was based upon an egocentrically referenced point of view; or what about the child who categorized the sea shells into three groups with no consideration that substance, attribute and function are discreet properties.

Existing theory based upon cognitive research suggests that a child ages three to eight may be handicapped with regard to efficient reading skills, because of limited abilities in logical thinking. If this possibility exists, then the dominant question is one that asks for evidence that reading is in fact a thinking skill.

The research of Goodman, K. (1965, 1967, 1973) and Goodman, Y. (1970) shows that regardless of proficiency all readers are users of language. They attempt to use graphic, syntactic, and semantic cues to get meaning from the written language by sampling, predicting, and confirming. Proficient readers are both efficient and effective. As effective readers they get the most meaning out of the task. As efficient readers they do it with the least amount of energy and effort. Readers do not identify each word then each sentence of words such an approach is, according to Goodman, both inefficient and ineffective.

Predictions, guesses, confirmations, and corrections are all thinking skills that contribute to the formation of an hypothesis. The latter is a synthesis of skills that from Goodman's point of view is essential for effective reading to occur. Therefore, a basis for better reading may very well rest upon a prereading program which uses the child's own language structure and emphasizes teaching for logical thought.

Teaching for Logical Thought

The implementation of practice based upon theory has direct bearing upon ideas concerned with the teaching of logical thought. Support for such practice is found in a comprehensive review by Flavell and Wohwill (1969). This review of structured experience indicates that whatever expereince underlies the development of logical thinking it is in all probability very broad and very general in nature or structure, so, attempts at teaching a specific concept by emphasizing its narrowly defined components does not meet the requirements of experience, as found in the childs "natural" environment.

Siegel (1972) and Wohwill (1969) have shown that cognitive development appears to advance on a broad horizontal front. Concepts of logical thought can be taught appropriately when many experiences of a related nature are emphasized. A horizontal emphasis allows the child to transfer problem solving skills from one learning experience to another experience of a similar nature.

Siegel (1972) attempted to improve childrens classification skill by providing practice with grouping. He provided children experiences in several realted areas, notably grouping by color, form, structure, and relationship (i.e., "a hammer is used to pound nails"). The outcome was an increase in the understanding of classification which Siegel identifies as an important logical thinking skill. Wohwill (1969) was concerned with experiences that related to the understanding of conservation, a concept that is notoriously hard to teach. Wohwill's strategy was to provide children opportunities to investigate and perform functions of measurement with length, volume weight and distance. While the mastery of conservation was not achieved, the relationship of these four areas of measurement to it's function was established. Wohwill concludes that the relationship between experience and opportunities to transfer problem solving skills is instrumental in increased understanding of conservation.

Both Siegel and Wohwill affirm the importance of teaching many related concepts, by providing children with experience that makes possible the transfer of significant problem solving techniques and ideas. In other words, advancing new knowledge on a broad nonspecific horizontal front.

Synthesizing the research of Siegel, Wohlwill and the Goodman's shows that evidence exists to support the theorization that reading is a thinking skill, and that thinking skills can be taught when likeness in problem solving techniques are emphasized. The implication of these findings relates to what classroom practice should be like.

Theory into Practice

Goodman tells us reading involves some high level thinking skills. Siegel and Wohlwill show that thinking skills can be taught. What should we do in the classroom?

Environments which perform the functions supported by research may be designed when teachers are aware of how young children learn. Children learn by working with an array of materials, they are active manipulators, they seek their own level of mastery, they transfer knowledge and skill from one activity to another. The environment a teacher creates must be rich in materials. To maximize the learning of young children, it is important to offer many opportunities for them to transfer information on a broad front, from one activity to another, and from one concept area to another.

It has been suggested above (Goodman, 1967) that hypothesis formation is an important skill for young readers to learn. An hypothesis is formed by making statements and drawing conclusions through investigations of many materials and forms of similar objects. Some activities that provide opportunities for transfer of learning and the development of hypotheses are: patterning, comparing, classifying, and predicting. Such activities can be generated through

art activities, cognitive activities and psychomoter activities.

The following example is based upon the effects of transfer, when children are able to experience many activities within the classroom environment. The activities are proposed as ones that assist in learning how to develop hypotheses.

1. Patterning is designed to help children observe and become aware of repetition. This may be facilitated through the use of auditory, visual and tactile discrimination.
   In a group activity awareness of patterns might be created through clapping a sequence in cadence, drawing attention to patterns of color, and texture in clothing.
2. Comparison builds upon skills of observation as children create distinctions between or similarities to objects, materials, and ideas.
   Comparison tasks are not only prereading, but prenumber as well. Their direct transfer value is found with categorization and patterning.
3. Classification may be promoted through tasks which require children to make decisions by creating two or more groups with any variety of materials or ideas.
   Through classification children may create inferences which lead to predication or back to comparison.
4. Predictions are made on the basis of prior learning and experience. Prediction is significant in that it teaches children how to pose questions before assigning answers.
5. Hypotheses are formed by making statements and conclusions

through investigations of many materials and forms of similar objects. Ultimately the child determines logical consequences from predetermined clues.

The classroom environment would provide several centers for learning activities related to the six areas in the example. Since young children learn by active manipulation and experience with materials, sufficient range from simple to complex should be provided at each center, so children can find their level of work. Some center activities are:

Center for Patterning - Activities

1. Copy the colored pattern in crayon on a 1 inch x 10 inch grid.
2. Repeat the patterns on the peg board with colored pegs.
3. Make an original pattern by glueing maccaroni on construction paper.
4. Create a pattern through repetition of numerals.
5. Create a pattern on a 2 inch x 24 inch strip of paper by glueing on object (paper) with two properties - such as shape and color.

Center for Comparison - Activities

One of the most difficult skills for a young child to learn is observation of the environment, both patterning and comparison help develop this skill.

1. Children can learn distinctions between or similarities to: size, texture, shape, and color.
2. Compare the growth rate of plants, animals and seedling.
3. Weigh or measure objects and materials for mass length, size, number.
4. Compare degrees of cold or heat.
5. Count objects (beads or small cubes) to determine amount compared to appearance of volume.

6. Compare, match and group or sort objects and materials on the basis of self chosen or designated features (properties).

Center for Classification - Activities

1. Classify by color, shape, structure.
2. Classify by use or other relationship.
3. Classify and arrange in three or more groups by some ascending or descending order.
4. Create multiple categorizations that relate objects by two or more properties.
5. Group by alike and not alike.
6. Group by properties like soft vs. hard, round vs. flat and thin vs. fat.

Center for Prediction - Activities

1. Test the effect of prediction through use of magnets, scales, balances, water and volume measurement.
2. Use charts which inquire as to how many _____ can you pick up in one hand.
3. How many cotton balls fit in jar #1, in jar #2 and in jar #3.
4. Predict how long (length) the sweet potato will grow.

Center for Hypotheses - Activities

1. Make statements and draw conclusions concerning: water, ice, steam, cooking, materials whose shape may be altered, sand, and dry tempera powder.
2. Work with batteries, lights, buzzers and switches.
3. Make statements about salted, spiced and untreated meat products with respect to preservation properties.
4. Investigate the tactile qualities of sticky substances - how can the sticky property be changed?
5. Investigate the effect of heat, flame and cold on various objects or substances.

Activities such as the ones suggested are very familiar to teachers, in fact it is their familiarity that makes them appropriate as an example. The important aspect is to build for transfer of information and problem solving skill. Logical thinking does not develop in a precise vertical arrangement, but is developed when many activities of a broad general nature are presented to the child. In the classroom the presentation should appear unstructured, but in effect be carefully planned and support a broad structure of experience.

Although there is no definite research investigating the relationship between thinking and reading - there is a vast amount of research that suggests the synthesis is a viable one. Therefore, it does not seem unreasonable to suggest that facility with logical thinking is necessary before one can master the formal and rule content of reading. If this is indeed the case, then structuring the classroom to promote logical thought by teaching for the transfer of problem solving skills may be an overlooked attribute of prereading instruction.

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